

value provided is against all 8 strains of *S. aureus* tested except where indicated otherwise. Table 4 shows the MIC values of 3 compounds selected as examples against other gram-positive bacteria, including 2 strains resistant to the first line antibiotic vancomycin.

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Table 3

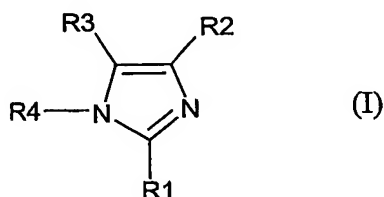
Compound	MIC( $\mu\text{g/ml}$ )
1	8-16
5	>128
7	4-16
9	8
11	8
13	2-4
15	>128
17	16 <sup>1</sup>
19	4
21	8-16
23	4-8
25	32-64
27	32-64
29	>128
31	4
33	4-8
35	8
38	>128
40	>128
42	4
44	8
6	4
8	2
10	4

Compound	MIC( $\mu$ g/ml)
20	2-4
26	2
28	2 <sup>2</sup>
32	8
34	>128
36	2
39	>128
41	>128
43	4
45	0.5
48	4-8
50	>64
51	16
52	>64
53	1
54	2-4
55	2
56	1
37	>128
46	4
49	4
400	>128
57	16
58	4
59	32
60	64
61	8
62	2
63	2

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ART 34 AMDT

**THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:**

1. Use of a compound having structural formula (I), or a salt thereof, as an anti-microbial agent,



wherein:

R1 is aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

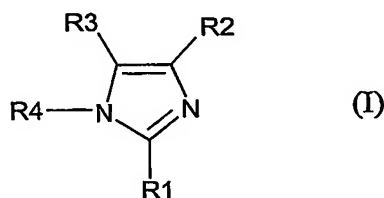
R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl or substituted aryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkylalkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano.

2. The use according to claim 1, wherein said anti-microbial agent is for the treatment or prevention of a microbial infection in an animal in need thereof.
3. The use according to claim 1, wherein said anti-microbial agent is formulated for incorporation into a cosmetic product, personal care product, cleanser, polish, paint, spray, soap, or detergent.

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4. Use of a compound having structural formula (I), or a salt thereof, in the treatment or prevention of a microbial infection, or a disease or disorder associated therewith, in an animal in need of such therapy,



wherein:

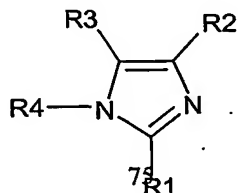
R1 is aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl or substituted aryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano.

5. The use according to claim 4, wherein said compound of structural formula I is used in combination with one or more anti-microbial agent(s).
6. The use according to claim 4 or 5, wherein said microbial infection, or disease or disorder associated therewith, is a bacterial infection, or disease or disorder associated therewith.

7. The use according to claim 4 or 5, wherein said microbial infection, or disease or disorder associated therewith, is a fungal infection, or disease or disorder associated therewith.
8. The use according to claim 6, wherein said bacterial infection, or disease or disorder associated therewith, is caused by *Corynebacterium xerosis*, *Chlamydia pneumoniae*, *Chlamydia trachomatis*, *Enterobacter cloacae*, *Enterobacter faecalis*, *Enterococcus faecium*, *Escherichia coli*, *Escherichia coli* O157:H7, *Haemophilus influenzae*, *Helicobacter pylori*, *Listeria monocytogenes*, *Moraxella catarrhalis*, *Neisseria gonorrhoeae*, *Neisseria meningitidis*, *Pseudomonas aeruginosa*, *Pneumococci* species, *Salmonella enterica*, *Salmonella typhimurium*, *Staphylococcus aureus*, *Staphylococcus aureus* K147, *Staphylococcus epidermidis*, *Staphylococcus typhimurium*, *Streptococcus mitis*, *Streptococcus pneumoniae*, *Streptococcus pyogenes*, *Vibrio cholerae*, *Mycobacterium tuberculosis*, *Mycobacterium africanum*, *Mycobacterium avium-intracellulare*, *Mycobacterium pneumoniae*, *Mycobacterium bovis*, *Mycobacterium leprae*, *Mycobacterium phlei* or *Bacillus anthracis*.
9. The use according to claim 7, wherein said fungal infection, or disease or disorder associated therewith, is caused by *Histoplasma*, *Coccidioides*, *Blastomyces*, *Paracoccidioides*, *Cryptococcus*, *Aspergillus*, *Zygomycetes*, *Basidiobolus*, *Conidiobolus*, *Rhizopus*, *Mucor*, *Absidia*, *Mortierella*, *Cunninghamella*, *Saksenaea*, *Candida*, *Cryptosporidium parvum*, *Sporothrix schenckii*, *Piedraia hortae*, *Trichosporon beigeli*, *Malassezia furfur*, *Phialophora verrucosa*, *Fonsecae pedrosoi*, *Madurella mycetomatis* or *Pneumocystis carinii*.
10. Use of a compound having structural formula (I), or a salt thereof, in the preparation of an anti-microbial composition,



(I)

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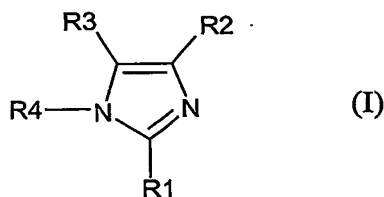
wherein:

R1 is aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl or substituted aryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano.

11. The use according to claim 10, wherein said anti-microbial composition further comprises one or more anti-microbial agent(s).
12. A method of inhibiting the growth and/or proliferation of a microbial cell comprising contacting said microbial cell with an effective amount of a compound having general formula (I), or a salt thereof:



wherein:

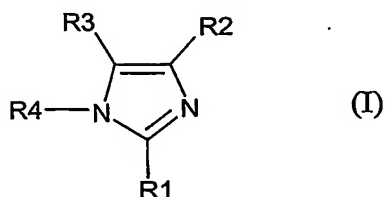
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R1 is aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl or substituted aryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano.

13. The method according to claim 12, further comprising contacting said cell with one or more anti-microbial agent(s).
14. The method according to claim 12 or 13, wherein said microbial cell is a bacterial cell.
15. The method according to claim 12 or 13, wherein said microbial cell is a fungal cell.
16. An anti-microbial composition comprising an effective amount of a compound having structural formula (I), or a salt thereof, and a carrier, diluent or excipient,



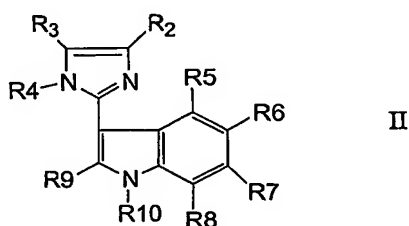
wherein:

R1 is aryl, substituted aryl, heterocycle, substituted heterocycle, heteroaryl, or substituted heteroaryl;

R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached to, form aryl or substituted aryl, and

R4 is hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano.

17. A compound having the structural formula:



or a salt thereof, wherein:

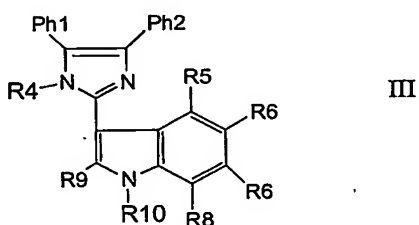
R2 and R3 are independently aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl or R2 and R3 when taken together along with the carbon atoms they are attached form aryl or substituted aryl, heterocycle, heteroaryl, substituted heterocycle, or substituted heteroaryl; R4, R5, R6, R7, R8 and R9 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted



heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

R10 is H, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, acyl, -CH<sub>2</sub>-aryl, -CH<sub>2</sub>-heteroaryl.

18. A compound having the structural formula:



or a salt thereof, wherein:

Ph1 and Ph2 are independently selected from phenyl and substituted phenyl;

R4, R5, R6, R7, R8 and R9 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

R10 is H, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, acyl;

with the proviso that the compounds are other than:

3-(4,5-diphenyl-1H-imidazol-2-yl)-1-methyl-1H-indole;

3-[4-(4-chlorophenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

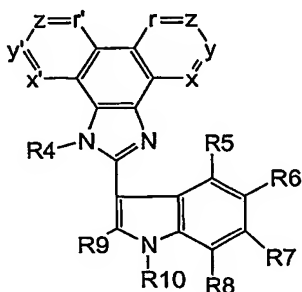
3-[4-(4-bromophenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-methylphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-methoxyphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;

3-[4-(4-ethoxyphenyl)-5-phenyl-1H-imidazol-2-yl]-1-methyl-1H-indole;  
 3-[4,5-bis (4-methoxydiphenyl)-1H-imidazol-2-yl]-1-methyl-1H-indole;  
 4,4'-[2-(2-phenyl-1H-indol-3-yl)-1H-imidazole-4,5-diyl]bis[N,N-dimethyl]benzenamine;  
 4,4'-[2-(5-chloro-1H-indol-3-yl)-1H-imidazole-4,5-diyl]bis[N,N-dimethyl]benzenamine;  
 2-(3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;  
 2-(3-indolyl)-4,5-bis[4-(diethylamino)phenyl]imidazole;  
 2-(2-phenyl-3-indolyl)-4,5-bis[4-dimethylamino]phenyl]imidazole;  
 2-(2-chloro-3-indolyl)-4,5-bis[4-dimethylamino]phenyl]imidazole;  
 2-(2-ethylcarboxylate-3-indolyl)-4,5-bis[4-dimethylamino]phenyl]imidazole;  
 2-(5-chloro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;  
 2-(5-cyano-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole;  
 2-(5-nitro-3-indolyl)-4,5-bis[4-(dimethylamino)phenyl]imidazole.

19. A compound having the structural formula:



VI

or a salt thereof, wherein:

R4, R5, R6, R7, R8 and R9 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

R10 is H, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, acyl;

x is CR11 or N;

y is CR12 or N;

z is CR13 or N;

r is CR14 or N;

x' is CR15 or N;

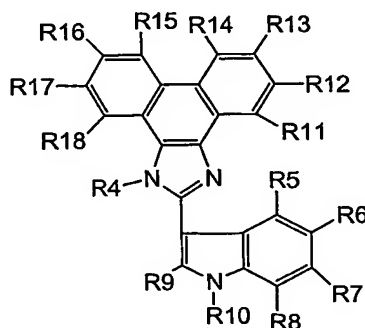
y' is CR16 or N;

z' is CR17 or N;

x' is CR18 or N;

R11, R12, R13, R14, R15, R16, R17 and R18 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, alkenyl, alkenyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano.

20. A compound having the structural formula:



VII

or a salt thereof, wherein:

R4, R5, R6, R7, R8 and R9 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, lower alkenyl, substituted lower alkenyl, lower alkynyl, substituted lower alkynyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido,

carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano;

R10 is H, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, acyl;

R11, R12, R13, R14, R15, R16, R17 and R18 are independently selected from hydrogen, halogen, hydroxyl, thiol, lower alkyl, substituted lower alkyl, alkenyl, alkenyl, alkylalkenyl, alkyl alkynyl, alkoxy, alkylthio, acyl, aryloxy, amino, amido, carboxyl, aryl, substituted aryl, heterocycle, heteroaryl, substituted heterocycle, heteroalkyl, cycloalkyl, substituted cycloalkyl, alkylcycloalkyl, alkylcycloheteroalkyl, nitro, or cyano.

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